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(54) Title: REMOTE DELIVERY OF MULTIMEDIA CONTENT FROM CONSUMER ELECTRONICS DEVICES

(57) Abstract: A remote playback system provides playback or other type of controlled delivery of an information signal available from a first device in response to one or more commands received from a second device, in situations in which the second device is in a location remote from the first device. In an illustrative embodiment, a network connection is established between the second device and a server coupled to, incorporated in or otherwise associated with the first device. The server receives control commands from the second device, and delivers the information signal over the network connection from the first device to the second device in response to the commands. The information signal may be, e.g., audio, video or other multimedia content. The first device may be, e.g., a television, video recorder, audio system, computer or other multimedia device in a home environment of a particular user, and the second device may be, e.g., a wireless device operated outside of the home environment. The invention thus allows a given user to direct the delivery of multimedia content available on that user's home devices, such as a broadcast program currently being received by a television or previously-recorded audio or video content, to other devices outside the home.

Remote delivery of multimedia content from consumer electronics devices

Field of the Invention

The present invention relates generally to consumer electronics devices, and more particularly to techniques for permitting remote playback or other delivery of audio, video or other types of multimedia content from such devices.

5

Background of the Invention

Numerous advances have been made recently in consumer electronics devices such as receiving, recording and playback devices for audio, video and other types of multimedia content. At the same time, communication technologies have also been
10 advancing at a rapid rate. For example, digital streaming technology has provided users with the ability to obtain multimedia content via computer networks such as the Internet. Significant advances are also occurring in other communication technology areas such as, e.g., home networking and automation, Internet access, and mobile wireless data services and devices.

15 Despite the above-noted advances, consumer electronics devices nonetheless continue to be configured primarily as stand-alone devices intended to be operated in a local mode, i.e., controlled by a user that is co-located with the device.

A number of techniques exist which attempt to apply one or more of the above-noted communications technologies to control of consumer electronics devices. For
20 example, a technique disclosed in German Patent No. DE19740079A1, entitled "Video recorder remote control method," allows a user to program a video recorder from a remote location via the Internet. Another similar conventional technique, described in Japan Patent Publication No. 10276478A entitled "Household Electric Appliance Controller," allows a user to control household electrical appliances from a remote location through a network
25 connection.

A significant problem with these and other conventional techniques is that they are unable to provide a two-way interactive channel between a user and a controlled consumer electronic device at a location remote from the user. More particularly, such techniques fail to take advantage of the above-noted advances in digital streaming and other

communication technologies to allow a user to control the streaming of audio, video or other multimedia content from a remote device to another device at the actual user location. For example, conventional techniques do not allow a user to direct that a video recorder, audio system or other consumer electronics device at their home play back previously recorded material over a link established with another device at another location. As a result, the user is unable to access the previously recorded material when away from home.

It is therefore apparent that a need exists for techniques for implementing playback of audio, video and other multimedia content from consumer electronic devices under the control of a user at a location remote from the devices.

Summary of the Invention

The present invention allows audio, video or other multimedia content to be played back or otherwise delivered from one or more consumer electronic devices to a user at a location remote from the one or more devices. The invention in an illustrative embodiment provides a two-way interactive channel between a remote user device and a controlled consumer electronic device not co-located with the user device, thereby allowing for efficient delivery of multimedia content from the controlled device to the remote user device.

In accordance with one aspect of the invention, a remote playback system provides playback of an information signal available from a first device in response to one or more commands received from a second device remote from the first device. A network connection is established between the second device and a server coupled to, incorporated in or otherwise associated with the first device. The server receives control commands from the second device, and delivers the information signal over the network connection from the first device to the second device in response to the commands. The information signal may be, e.g., audio, video or other multimedia content. The first device may be, e.g., a television, video recorder, audio system, computer or other multimedia device in a home environment of a particular user, and the second device may be, e.g., a wireless device operated outside of the home environment.

The server can be configured so as to stream the information signal to the second device in real time, and may also or alternatively be configured to deliver the information signal to the second device for storage and subsequent playback in the second device.

In accordance with another aspect of the invention, the server may present a hypertext page or other type of web page to a user of the second device, such that the user enters commands directed to the first device via the web page presented by the server.

Advantageously, the invention allows a given user to direct the delivery of
5 multimedia content available on that user's home devices, such as a broadcast program currently being received by a television or previously-recorded audio or video content, to other devices outside the home.

The invention thus facilitates the control of consumer electronics devices in a home environment or other type of environment, from a remote user device, in response to
10 user control commands entered at the remote user device. The user is provided with considerable flexibility in selecting content, and does not incur additional content-related access charges other than those related to provision of external network connections. These and other features and advantages of the present invention will become more apparent from the accompanying drawings and the following detailed description.

15

Brief Description of the Drawings

Fig. 1 is a block diagram of a system with remote playback of multimedia content in accordance with a first illustrative embodiment of the invention.

Fig. 2 is a block diagram of a system with remote playback of multimedia
20 content in accordance with a second illustrative embodiment of the invention.

Detailed Description of the Invention

The present invention provides techniques for remote playback of multimedia content from consumer electronics devices such as televisions, video recorders, personal
25 computers (PCs), audio systems, etc. Advantageously, the remote playback of the present invention is "personal" to a particular user or group of users, i.e., it allows a given user or group of users to playback multimedia content from their own device(s) when the user or users are not co-located with the device(s).

Fig. 1 shows a remote playback system 100 in accordance with a first
30 illustrative embodiment of the invention. The system 100 includes a home environment 110 that is assumed in this embodiment to be associated with a particular user. The home environment 110 includes a number of consumer electronic devices, i.e., a handheld wireless device 112, a television 114, a video recorder 116, an audio system 118, and a PC 120.

The handheld wireless device 112 may be, e.g., a wireless telephone equipped with a web browser, a personal digital assistant (PDA), a palmtop computer or other type of processor-based device. The handheld wireless device 112 may be configured to communicate with one or more other devices in the home environment 110 via a local wireless network, e.g., a
5 network configured to utilize a radio frequency (RF) wireless communication standard such as Bluetooth. The Bluetooth standard specifies a short-range RF network supporting packet data at data rates up to 700 kbps, which is sufficient to carry multimedia content in the home.

One or more of the devices 112, 114, 116, 118 and 120 may include digital multimedia streaming capabilities, and may operate in accordance with a wireless access
10 protocol (WAP).

Each of the devices 114, 116, 118 and 120 in this illustrative embodiment are coupled to a controlling central server 130 via suitable home network connections. These home network connections may be hard-wired connections, local area network (LAN) or other network connections, wireless network connections via an RF standard such as
15 Bluetooth, or various combinations of these and other network connections that may be established in the home environment 110.

The controlling central server 130 may include a web server for establishing connections with an external network such as Internet 140. The controlling central server 130 is also operative to establish connections with one or more other devices via the Internet 140,
20 e.g., a PC located in a work environment of the user and connected to a corporate local area network (LAN) or intranet.

The controlling central server 130 may also or alternatively include a WAP server for establishing connections with Internet 140 or other external networks such as wireless telephone network 150. Connections with the wireless telephone network 150 may
25 also be established by the controlling central server 130 through the Internet 140 as shown. The wireless telephone network 150 communicates with handheld wireless device 160 which is outside of the home environment 110.

As previously noted, the devices 112, 114, 116, 118 and 120 may each be coupled together over a home network. The controlling central server 130 serves as a
30 common "hub" for connecting each of these devices to the Internet 140, and includes a multimedia streaming capability. The controlling central server 130 may also or alternatively include a WAP or Hypertext Mark-up Language (HTML) server, so as to provide a common interface to other devices also containing servers, or it may simply route directly through from the home environment 110 to such devices.

By utilizing the multimedia streaming capability in the controlling central server 130, each of the devices 112, 114, 116, 118 and 120 are able to stream multimedia content via the Internet 140 to wireless telephone network 150, wireless handheld device 160 or other devices.

5 In operation, the system 100 allows the user associated with the home environment 110 to control this streaming of multimedia content from a device remote from the home environment 110. For example, when away from the home environment 110, the user can send appropriate control commands from, e.g., handheld wireless device 160 or another suitable device to the controlling central server 130 via the Internet 140. The
10 controlling central server delivers the control commands to the appropriate device or devices, receives the corresponding multimedia content therefrom, and streams the multimedia content via the Internet 140 back to the appropriate user device.

The user may access the controlling central server 130 of the home environment 110 by entering a corresponding Uniform Resource Locator (URL) into a
15 browser associated with the remote user device. A connection for sending the above-noted commands and receiving the streaming multimedia content is then established between the remote user device and the controlling central server 130 in a conventional manner.

When the user first establishes a connection with the controlling central server 130, the server 130 may present the user with an appropriate web page that allows the user to
20 enter the control commands in a convenient manner. Such a page can be in any suitable format, e.g., HTML, Extensible Mark-up Language (XML), WML, etc. In practice, control could be provided in the form of a very simple mechanism, e.g., a simple XML "start play" command. Control could also be provided for other settings of the devices 112, 114, 116, 118 and 120 in the home environment 110, e.g., record/playback, disk selection, timed record,
25 etc.

The controlling central server 130 may include various processing capabilities needed to interface between the remote user device and the devices 112, 114, 116, 118 and 120. For example, the controlling central server 130 may include additional processing required to compress an audio file into a suitable format to be delivered to audio system 118
30 in a standard format such as MP3. In addition, the controlling central server 130 can be configured to customize its content automatically when the remote user device communicates therewith, e.g., it may adjust data rate, image size, page text, etc. to suit remote device screen size or other attributes.

Communication between the remote user device and the controlling central server 130 of the home environment 110 may be implemented using a client/server model, using any suitable transport protocol, e.g., Transmission Control Protocol (TCP)/Internet Protocol (IP), and any desired format, e.g., MPEG-2 for video, Realaudio or MP3 for audio, etc.

5 It should be noted that the controlling central server 130 may deliver multimedia content in a real-time streaming format, or in any other suitable format, e.g., a format suitable for storing at the remote device for later playback. The controlling central server 130 may use many different combinations of available standards and technology, and should not be construed as limited to use with Internet standards.

10 Advantageously, the system 100 facilitates the control of consumer electronics devices in a home environment or other type of environment from a remotely-located user device. The invention allows the user to direct streaming of multimedia content from one or more of the devices in the home environment to the remote user device over the Internet or other suitable network connection. As a result, a user can, e.g., remotely control the recording
15 of a program on video recorder 116, while also watching the program on a remote device outside of the home environment 110.

A significant advantage of the present invention is that it permits delivery of multimedia content back to a user device in response to user control commands. The invention thus allows personal remote entertainment to be delivered from the user's own
20 devices within the home environment 110, without the intervention of a third party, other than network provision outside the home. The user is thus provided with considerable flexibility in selecting content, and does not incur additional access charges other than those related to external network provision.

Other examples of the manner in which the user can direct delivery of
25 multimedia content via the system 100 include the following:

1. Control remote playback of a private compact disk (CD) collection or video recording.
2. Watch the daily news from home while away on business.
3. Establish live television feeds direct from television 114 in home
30 environment 110 to any desired remote location.
4. Use a wireless device such as a telephone equipped with a browser and multimedia application program to receive multimedia content accessible in the home environment 110 anywhere the wireless network has coverage.

The remote user device which establishes the connection with the controlling central server 130 may be, e.g., the handheld wireless device 160 communicating with wireless telephone network 150, a computer or other device connected to the Internet 140, or any other suitable device capable of establishing a connection with the server 130.

5 It should be understood that the particular configuration of system 100 as shown in FIG. 1 is by way of example only. Those skilled in the art will recognize that the invention can be implemented using a wide variety of alternative system configurations.

FIG. 2 shows one possible alternative remote playback system 200 in accordance with a second illustrative embodiment of the invention. The system 200 includes
10 a home environment 210 that, like the home environment 110, is assumed to be associated with a particular user. The home environment 210 includes handheld wireless device 112, and a video recorder 220. In accordance with the invention, the video recorder 220 is a single device configured to include a server. The server is able to establish a connection with Internet 140 in a conventional manner, and is able to deliver multimedia content accessible
15 via the video recorder 220 to a remote user device, e.g., handheld wireless device 160 via wireless telephone network 150 and Internet 140. The server may include multimedia streaming capability, WAP capability, and/or other information processing capability.

In operation, the system 200 allows a remote user device to communicate with the server in the video recorder 220 so as to direct the delivery of multimedia content to the
20 remote user device. The system 200 thus operates in substantially the same manner as the system 100, but the functions of the controlling central server 130 are incorporated into the device 220. Of course, the home environment 210 of system 200 may include additional consumer electronic devices, e.g., a television, audio system, PC, etc., each including a server capable of communicating with a remote user device.

25 Although referred to as remote playback systems, the systems 100 and 200 may be used for other types of content delivery not involving playback of previously recorded information, e.g., real-time delivery of a broadcast signal received by a television, video recorder, computer or other device.

As previously noted, the systems shown in FIGS. 1 and 2 are illustrative only,
30 and the invention may be incorporated in numerous other systems. For example, the invention can be used in conjunction with any desired type of consumer electronics device, e.g., a television, a set-top box, a desktop, laptop or palmtop computer, a PDA, a video storage device such as a video cassette recorder (VCR), a digital video recorder (DVR), a TiVO device, etc., as well as portions or combinations of these and other devices. The remote

user device may communicate with these consumer electronic devices over a global computer communications network such as the Internet, a wide area network, a metropolitan area network, a local area network, a terrestrial broadcast system, a cable network, a satellite network, a wireless network, or a telephone network, as well as portions or combinations of these and other types of networks.

The invention can be used to implement remote multimedia delivery or playback in any desired type of processing system or device, and in many applications other than those described herein. In addition, the invention can also be implemented at least in part in the form of one or more software programs which are stored on an otherwise conventional electronic, magnetic or optical storage medium or other type of memory, and executed by a processing device, e.g., by a processor in server 130 of the system 100 of FIG. 1. These and numerous other embodiments within the scope of the following claims will be apparent to those skilled in the art.

CLAIMS:

1. A method for controlling delivery of an information signal available from a first device (112, 114, 116, 118, 120, 220) associated with an environment (110, 210) of a user, in response to one or more commands received from a second device (160) associated with the user but remote from the user environment, the method comprising the steps of:
 - 5 establishing a network connection between the second device and the first device;
 - receiving at least one command from the second device directed to the first device; and
 - delivering the information signal over the network connection from the first device to the second device in response to the command.
- 10 2. The method of claim 1 wherein the information signal comprises multimedia content including at least one of an audio signal and an image signal.
3. The method of claim 1 wherein the information signal comprises multimedia content including a broadcast video signal received by the first device.
- 15 4. The method of claim 1 wherein the first device comprises at least one of a television (114), a video recorder (116, 220), an audio system (118), a computer (120), and a wireless device (112).
- 20 5. The method of claim 1 wherein the second device comprises a device capable of establishing a connection over a network.
6. The method of claim 1 wherein the first device communicates with the second device via a server (130) associated with the first device.
- 25 7. The method of claim 6 wherein the first device is coupled to the server, and the server is coupled to at least one additional device co-located with the first device.

8. The method of claim 6 wherein the server is at least partially incorporated within the first device.

9. The method of claim 6 wherein the server streams the information signal to the
5 second device in real time.

10. The method of claim 6 wherein the server delivers the information signal to the second device for storage and subsequent playback in the second device.

10 11. The method of claim 6 wherein the server communicates with the second device over the Internet (140).

12. The method of claim 6 wherein the server is operative to present a web page to a user of the second device, such that the user enters the command directed to the first device
15 via the web page presented by the server.

13. The method of claim 1 wherein the first device is one of a plurality of devices associated with a home environment (110, 210) of the user, and the second device is in a location remote from the home environment.

20

14. An apparatus for controlling delivery of an information signal available from a first device (112, 114, 116, 118, 120, 220) associated with an environment (110, 210) of a user, in response to one or more commands received from a second device (160) associated with the user but remote from the user environment, the apparatus comprising:
25 a server (130) associated with the first device, wherein the server is operative: (i) to establish a network connection between the second device and the first device; (ii) to receive at least one command from the second device directed to the first device; and (iii) to deliver the information signal over the network connection from the first device to the second device in response to the command.

30

15. The apparatus of claim 14 wherein the first device is coupled to the server, and the server is coupled to at least one additional device co-located with the first device.

16. The apparatus of claim 14 wherein the server is at least partially incorporated within the first device.

17. The apparatus of claim 14 wherein the server streams the information signal to
5 the second device in real time.

18. An article of manufacture comprising a machine-readable medium containing one or more software programs which when executed control delivery of an information signal from a first device (112, 114, 116, 118, 120, 220) associated with an environment
10 (110, 210) of a user, in response to one or more commands received from a second device (160) associated with the user but remote from the user environment, by implementing the steps of:

receiving at least one command from the second device directed to the first device; and

15 delivering the information signal over a network connection from the first device to the second device in response to the command.

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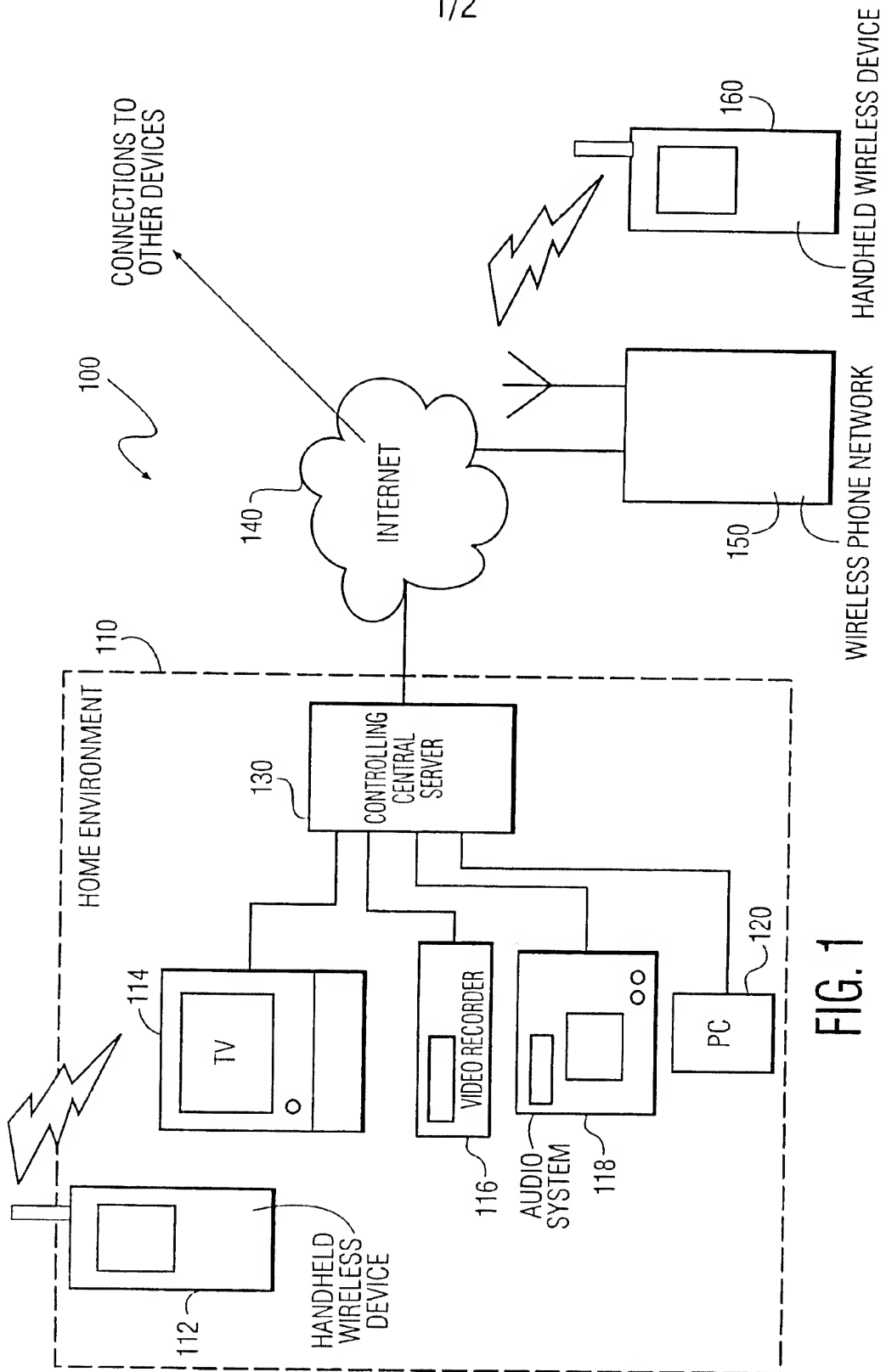


FIG. 1

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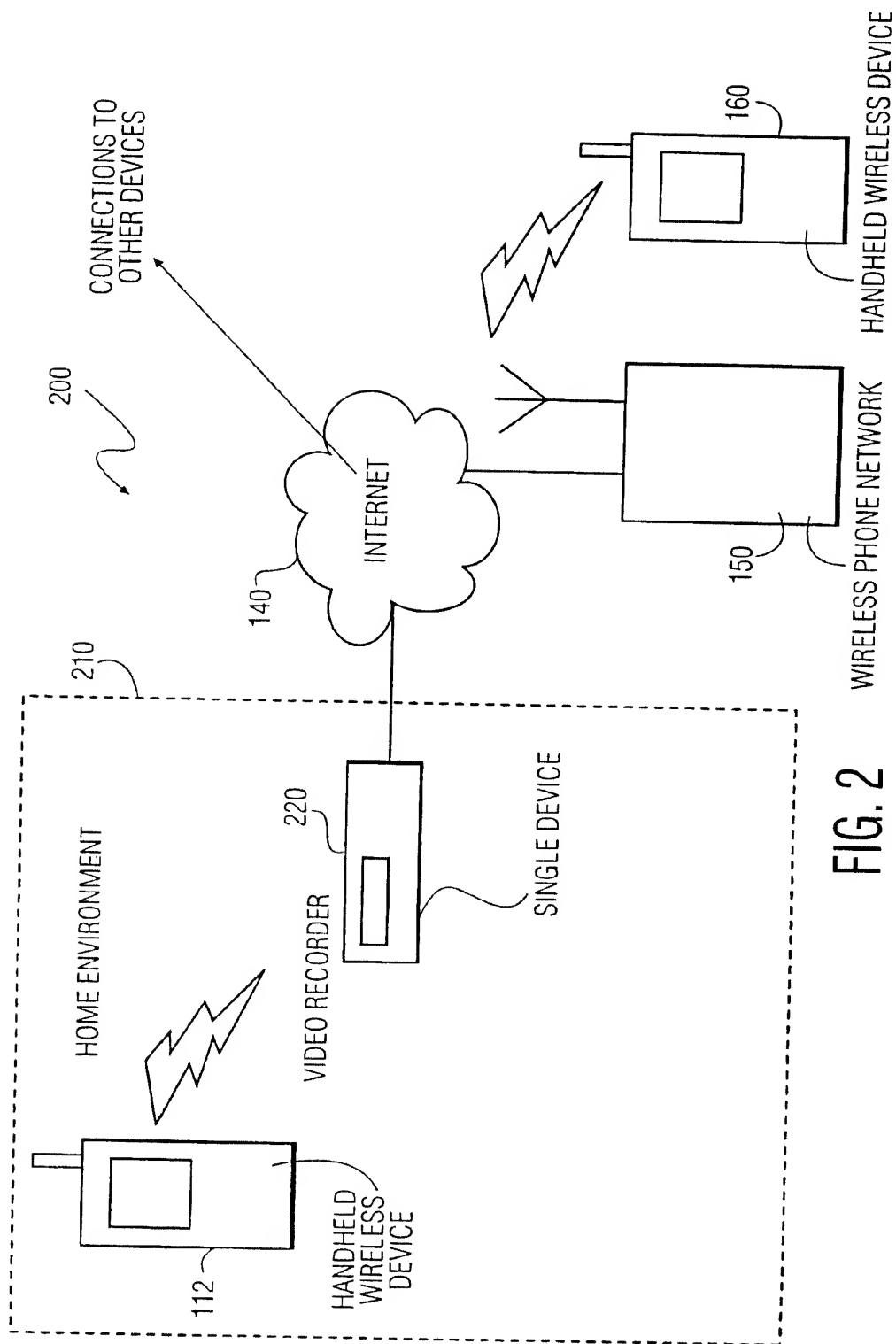


FIG. 2